132

SEVENTY-FIVE YEARS OF EXCELLENCE

NAS 1.83:

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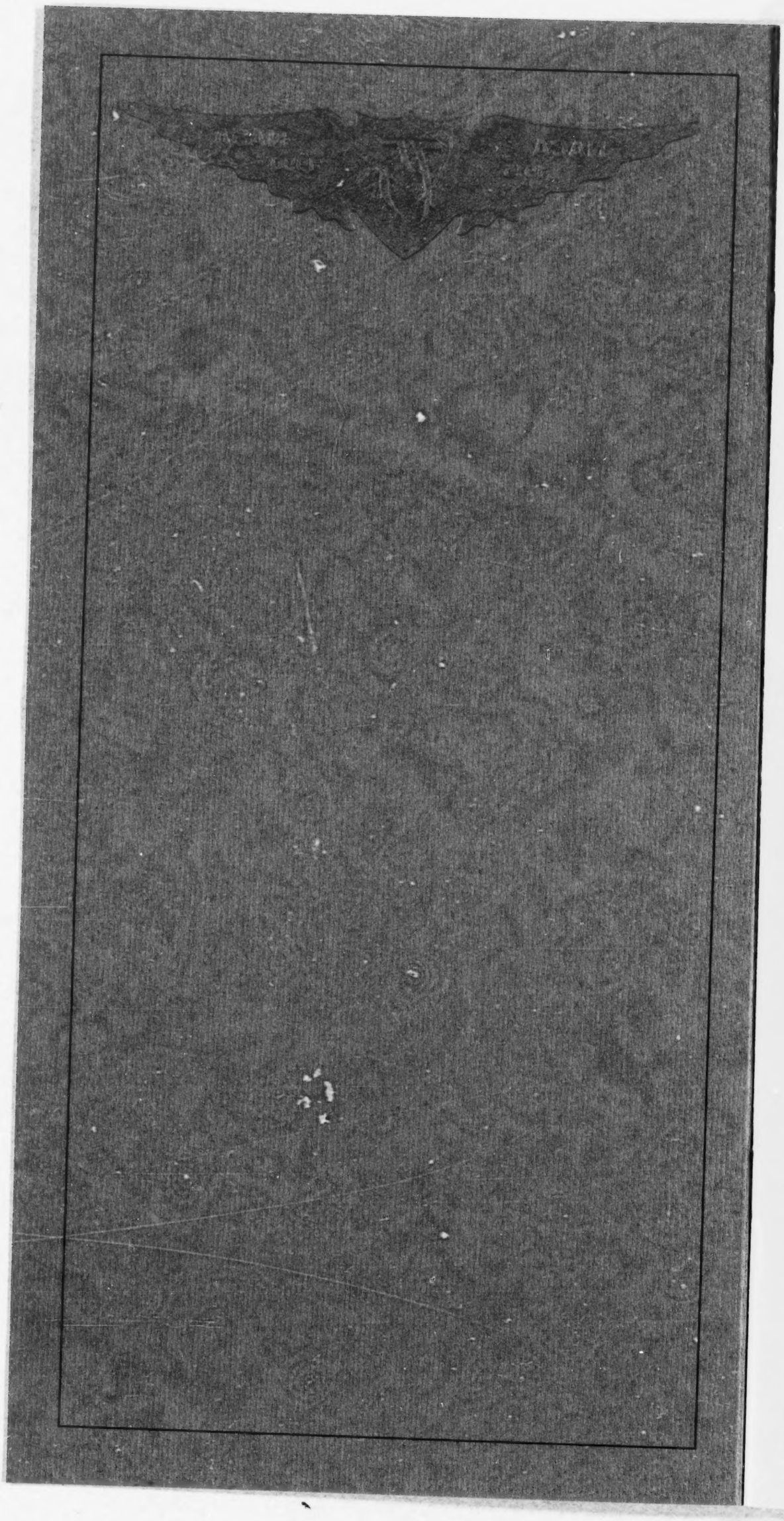
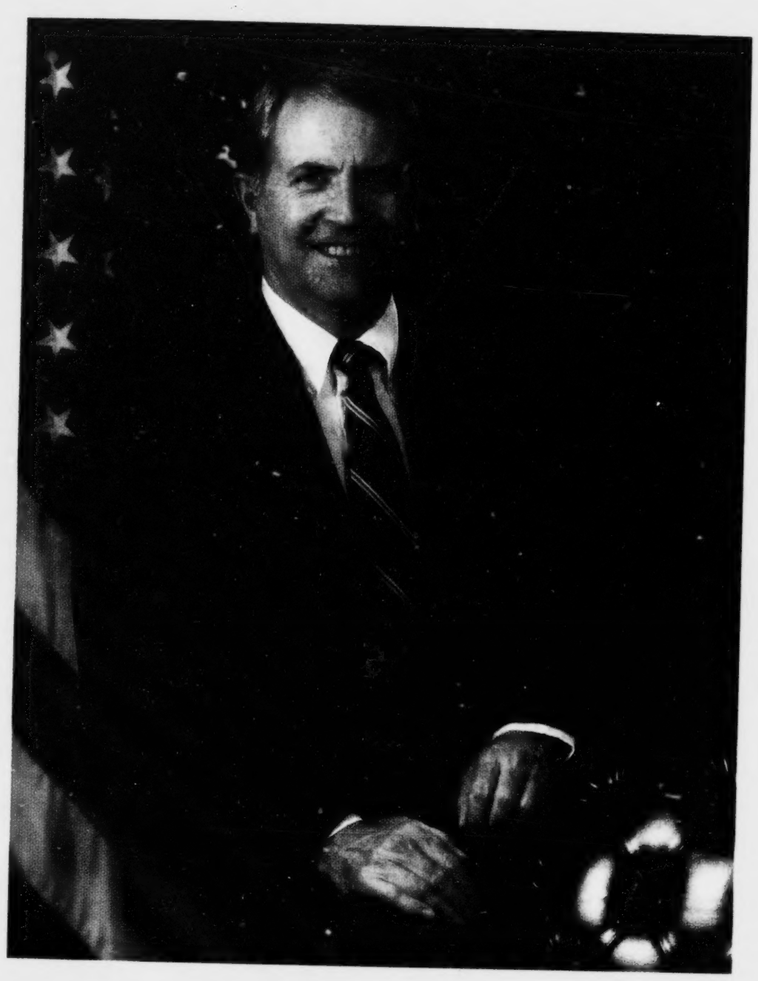
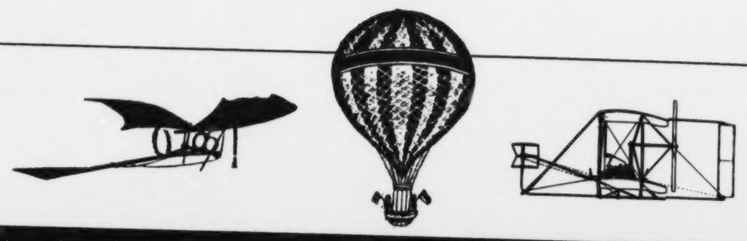




"NASA'S FIRST "A" STANDS FOR AERONAUTICS, AND AERONAUTICS STANDS FOR COMPETITIVENESS, FOR OUR ECONOMY, FOR OUR CIVIL TRANSPORTATION, FOR OUR DEFENSE.... THAT "A" REPRESENTS OUR ROOTS, OUR HERITAGE. AND WHEREVER WE GO IN THE FUTURE — BACK TO THE MOON, TO MARS, TO THE MOONS OF JUPITER AND SATURN — WHEREVER, WE WILL NEVER FORGET OUR HERITAGE THAT BEGAN AT KITTY HAWK IN 1903, SO CAREFULLY NURTURED BY NACA IN 1915 AND NASA IN 1990."

RICHARD H. TRULY
ADMINISTRATOR
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



1915

With a budget of only $5,000, the National Advisory Committee for Aeronautics was established in 1915 "...to supervise and direct the scientific study of the problems of flight, with a view to their practical solution...." Created to help ensure U.S. preeminence in aviation, NACA subsequently became the nucleus of the National Aeronautics and Space Administration, established in 1958 to fulfill a similar goal with respect to the nation's space programs as well as aeronautics.

This anniversary commemorates 75 years of NACA/NASA research and technology support to the government agencies and industries involved in the advancement, development, procurement, operation, and regulation of U.S. aeronautical systems and products — and recalls the birth and dramatic development of the pioneering space programs which evolved as "aeronautics" and expanded to become "aerospace."

This brochure highlights major contributions and events of each decade.

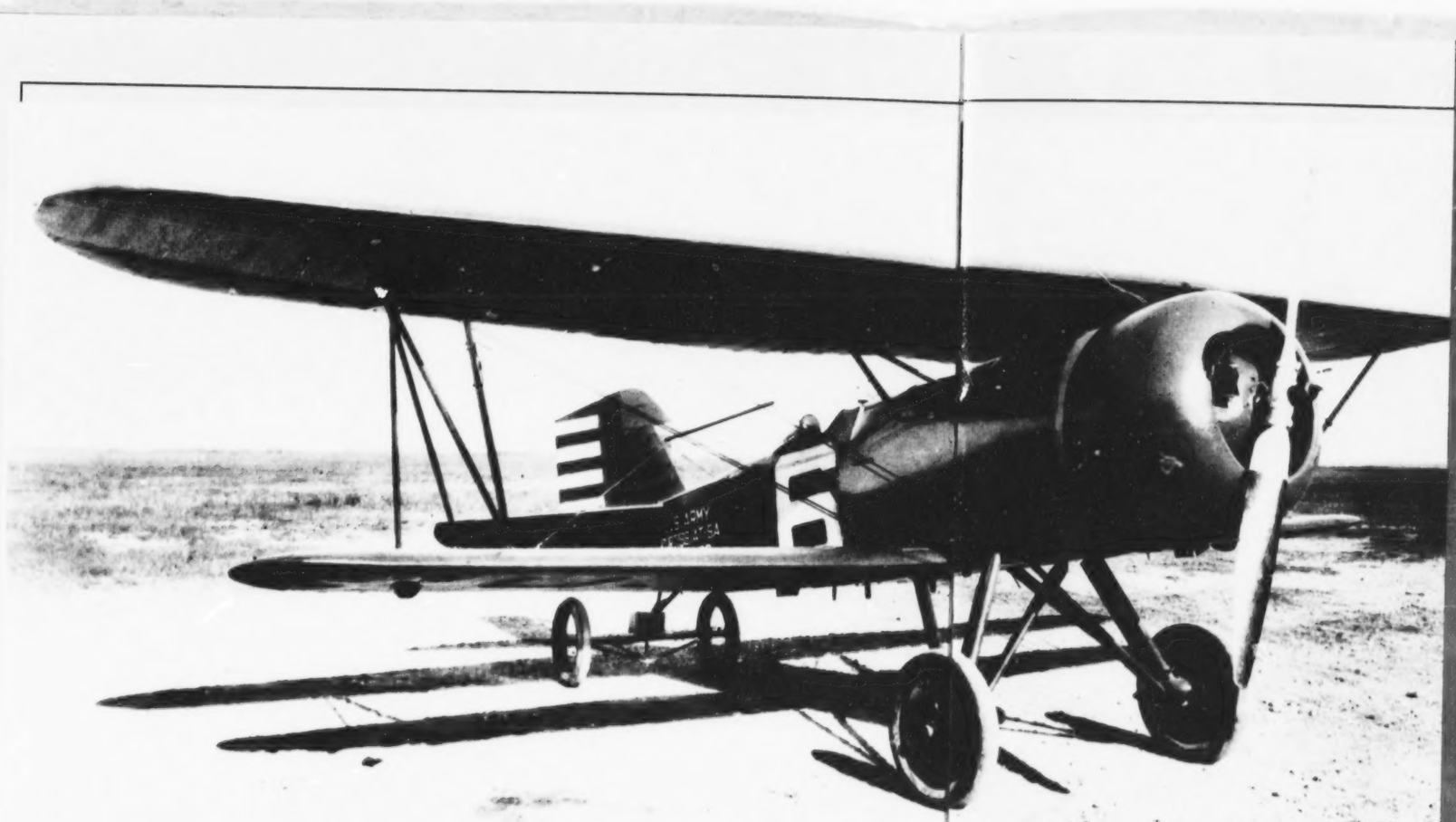
National Advisory Committee for Aeronautics meeting on April 23, 1915. Seated, left to right: W.F. Durand, S.W. Stratton, G.P. Scriven, C.P. Marvin, M.I. Pupin. Standing: H.C. Richardson, J.F. Hagford, M.L. Bristol, S. Reber. Not shown: J.S. Ames, B.R. Newton, and C.D. Walcott.

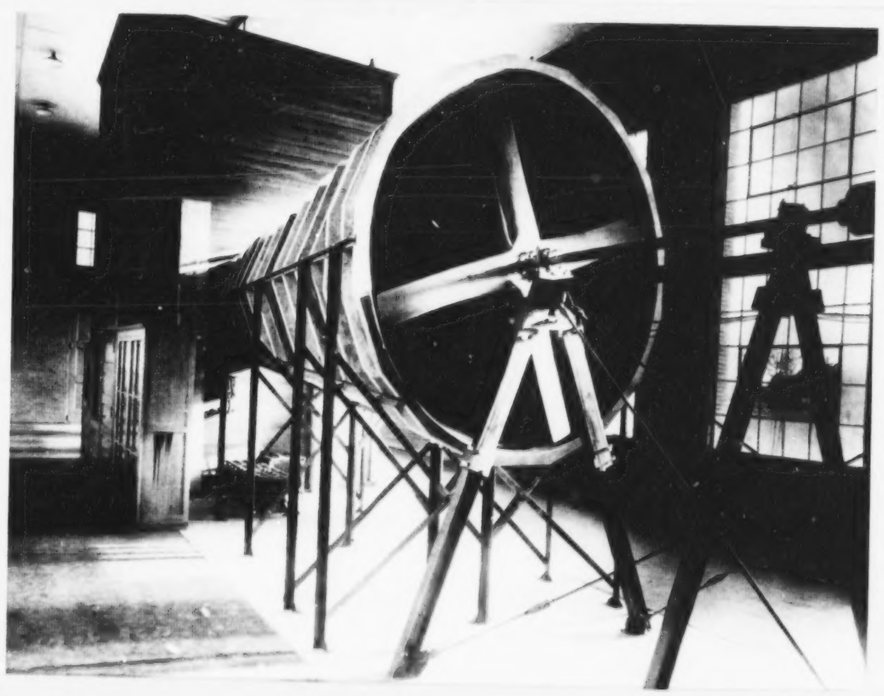
Later membership included other renowned aviation figures including Orville Wright, Harry Guggenheim, Charles Lindbergh, Generals "Hap" Arnold and James Doolittle, and Capt. Eddie Rickenbacker.

National Advisory Committee for Aeronautics

Initial NACA Sponsored Tunnel, Propeller, and Engine Testing

First Research on Curtiss JN-4H Jenny





Low-drag cowling wind tunnel tests were verified in flight on the Curtiss Hawk AT-5A (top), showing a 16-percent speed increase.

Early 5-foot atmospheric wind tunnel tests (above) were correlated with results of flight research on the Curtiss JN-4H "Jenny" (above right).

1920's

FOUNDATION

THEORETICAL ANALYSIS, WIND TUNNEL TESTS, AND FLIGHT EXPERIMENTS SET THE STANDARDS FOR NACA/NASA RESEARCH METHODS.

LANGLEY MEMORIAL AERONAUTICAL LABORATORY (LANGLEY RESEARCH CENTER).

5-FOOT ATMOSPHERIC WIND TUNNEL

VARIABLE DENSITY WIND TUNNEL

FIRST NACA AIRCRAFT ENGINEERING MANUFACTURERS CONFERENCE

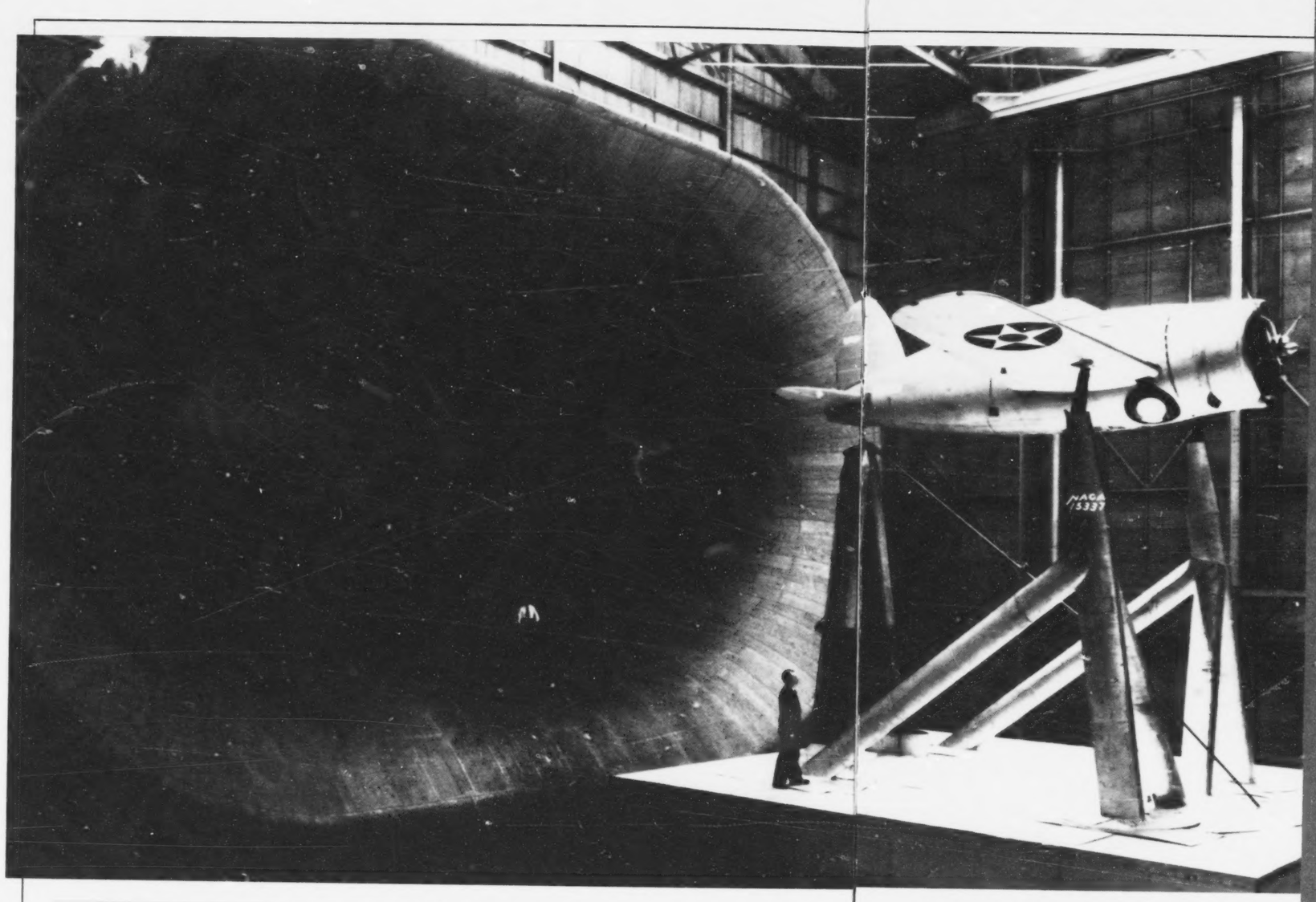
PROPELLER RESEARCH TUNNEL

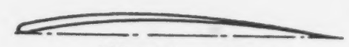
FIRST HIGH-SPEED TUNNEL (MACH 1)

NACA LOW-DRAG COWLING

REFRIGERATED WIND TUNNEL

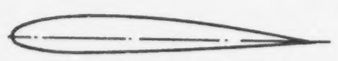
NACA AIRFOIL SERIES INITIATED





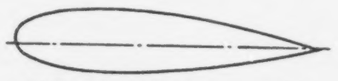
Wright 1908

U.S.A. 27 1919

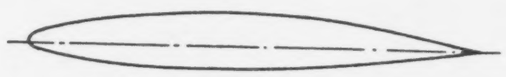


N.A.C.A. 2412 1933

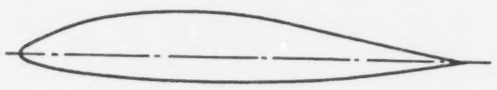
N.A.C.A. 23012 1935



N.A.C.A. 23021 1935



N.A.C.A. 661-212 1940

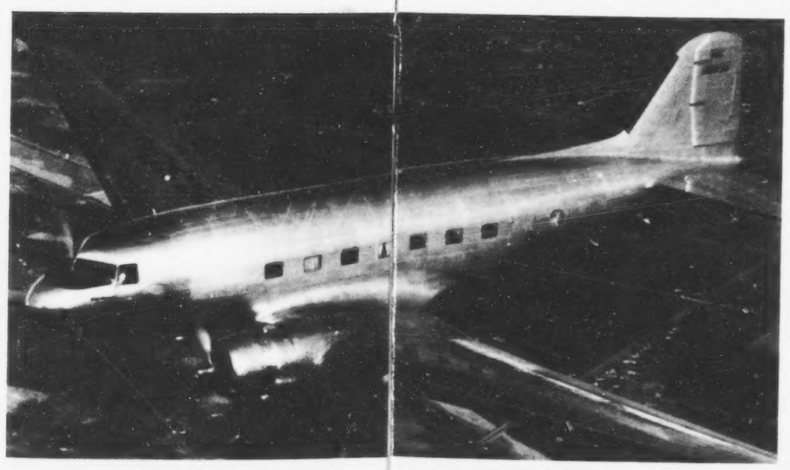


N.A.C.A. 747A315 1944

In the 30 x 60-foot tunnel (above), full-scale aircraft tests on effects of manufacturing details led to important "drag cleanup" improvements.

Extensive research on systematic design variations (left) resulted in new understanding of airfoil performance and permitted designers to select airfoils for specific applications.

The Douglas DC-3 (below) was used in flight research on transport handling qualities and gust response.



1930's

Innovation

NACA research leads to more streamlined airplanes, and its 1933 report on airfoil sections becomes a "designer's bible" for future generations of aircraft.

30x60-Foot Full-Scale Tunnel

Initial Rotary Wing Research

Hydrodynamics Research

Engine-Out Procedures for DC-3

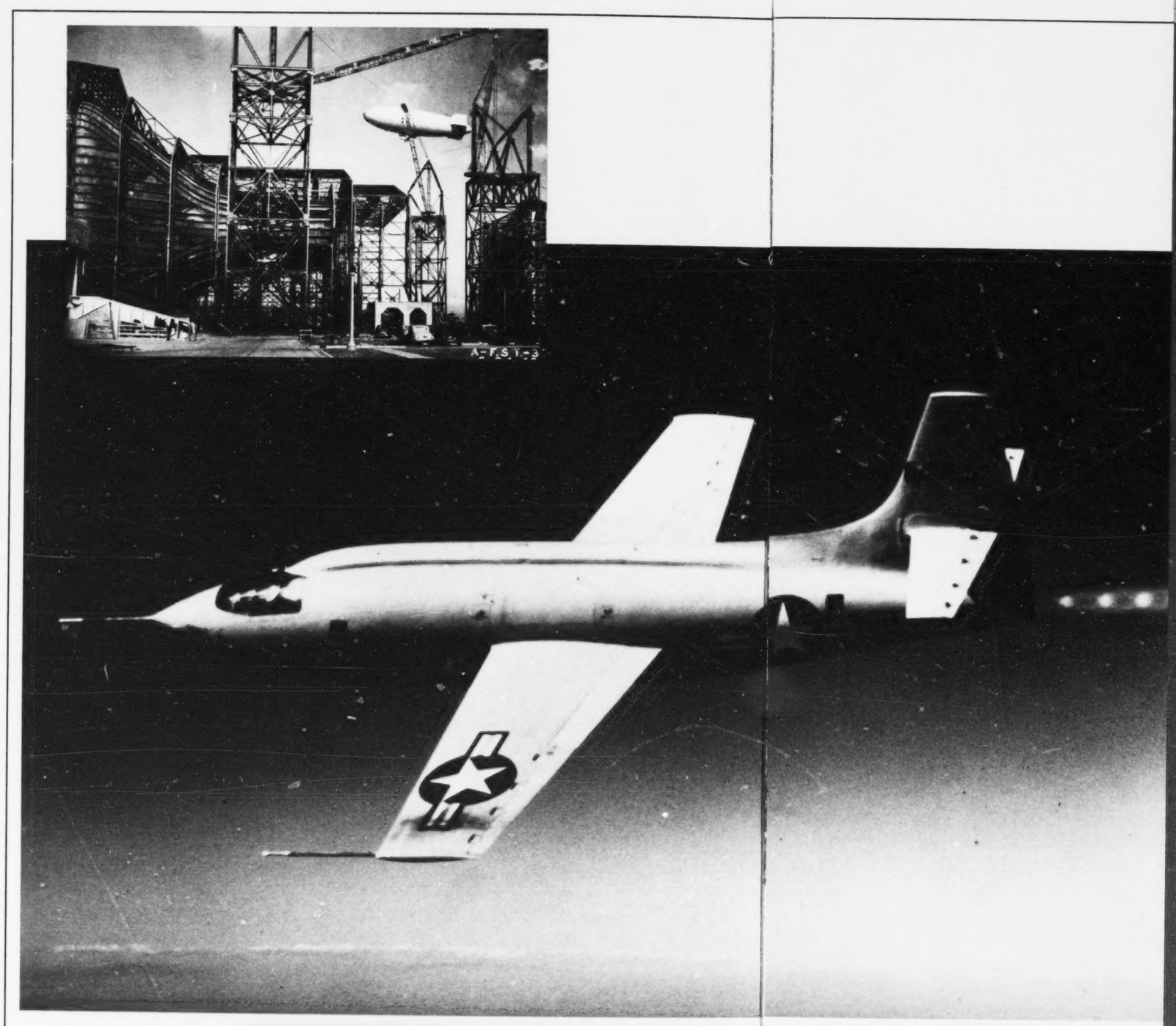
8-Foot High-Speed Wind Tunnel

Drag-Reduction Research

Laminar Flow Airfoil Research

Military Aircraft Performance Evaluations

Aircraft Handling Qualities Criteria



The larger, more powerful 40 x 80-foot tunnel (top) expanded full-scale test capability to larger, faster aircraft.

Supersonic flight of the Bell X-1 (center) was a landmark achievement and a forerunner of numerous "X-Aircraft" research accomplishments.

Initial swept-wing research was verified in flight on the Navy Bell L-39 and the X-5 research aircraft (left).

1940's

GROWTH

NEW FACILITIES GIVE THE NACA UNIQUE RESEARCH CAPABILITIES THAT SUPPORT AMERICAN AIR POWER IN WWII AND THE POST-WAR QUEST FOR SPEED AND PERFORMANCE.

AMES AERONAUTICAL LABORATORY (AMES RESEARCH CENTER)

AIRCRAFT ENGINE RESEARCH LABORATORY (LEWIS RESEARCH CENTER)

HIGH-ALTITUDE ENGINE TECHNOLOGY

40x80-FOOT WIND TUNNEL

ICING RESEARCH TUNNEL

SWEPT-WING RESEARCH

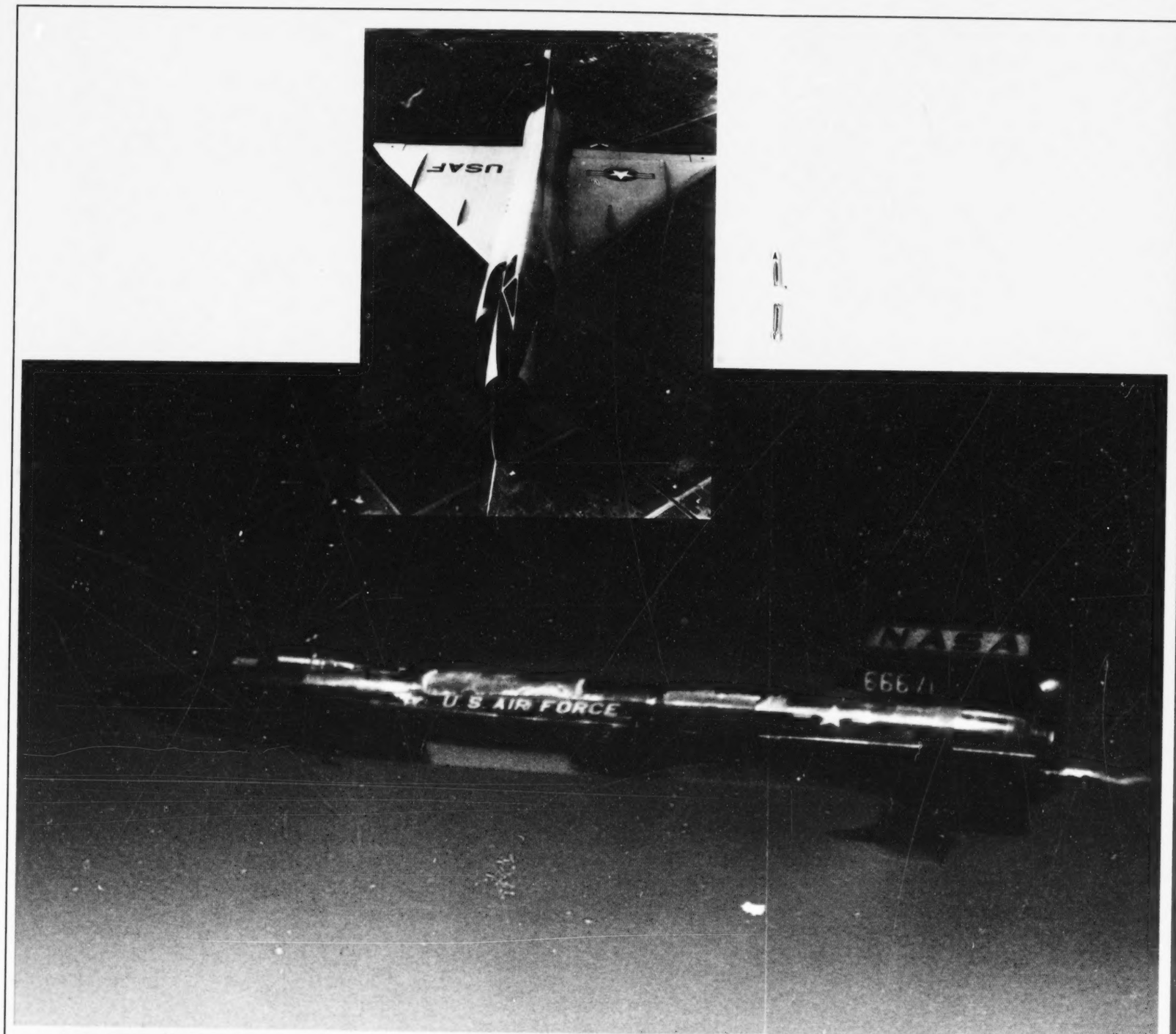
THERMAL ICE PREVENTION SYSTEM

MUROC FLIGHT TEST UNIT (AMES-DRYDEN FLIGHT RESEARCH FACILITY)

PILOTLESS AIRCRAFT RESEARCH DIVISION OF LANGLEY (WALLOPS FLIGHT FACILITY)

PIONEERING X-AIRCRAFT FLIGHT RESEARCH

UNITARY PLAN WIND TUNNEL ACT OF 1949



The "area rule" concept for transonic drag reduction was proven in XF-102 flight testing (top).

X-15 hypersonic, high-altitude flight research yielded invaluable data on aerodynamic heating, high-temperature materials, reaction controls, and space suits (center).

The new emphasis on space flight broadened the horizons for research pilots. Shown here (left) are the seven original astronauts.

1950's

Frontiers

New and improved technology "pushes the envelope" of atmospheric flight, paving the way for the space age and the creation of NASA—the National Aeronautics and Space Administration.

Slotted-Wall Wind Tunnel

Blunt/Lifting Bodies for Re-entry Vehicles Research

Variable Sweep Research

Area Rule Verification

Liquid Hydrogen Fuels

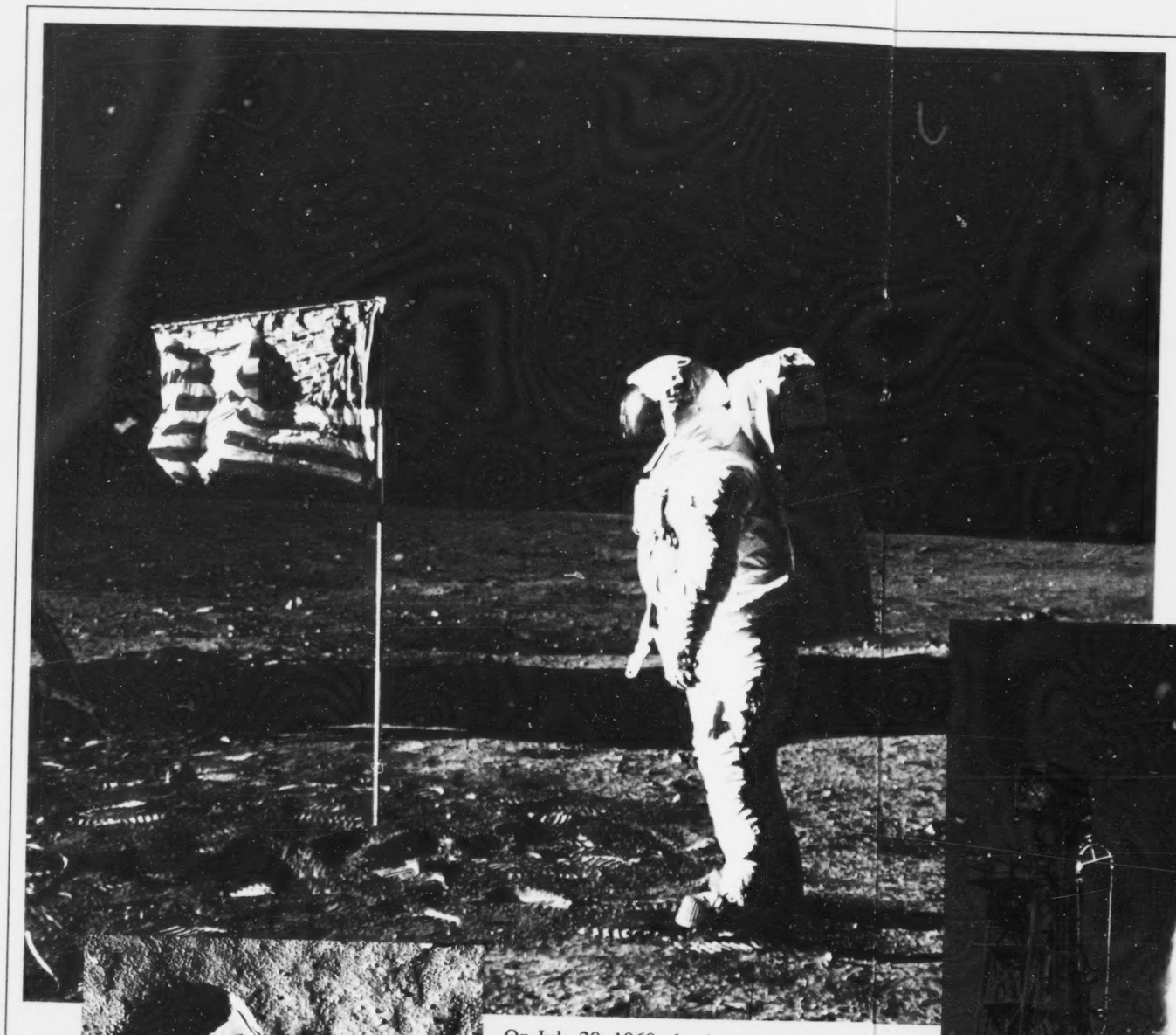
Explorer–America's First Satellite

Space Act Signed NASA Established

Jet Propulsion Laboratory Transferred to NASA

X-15 Flight Testing

Goddard Space Flight Center



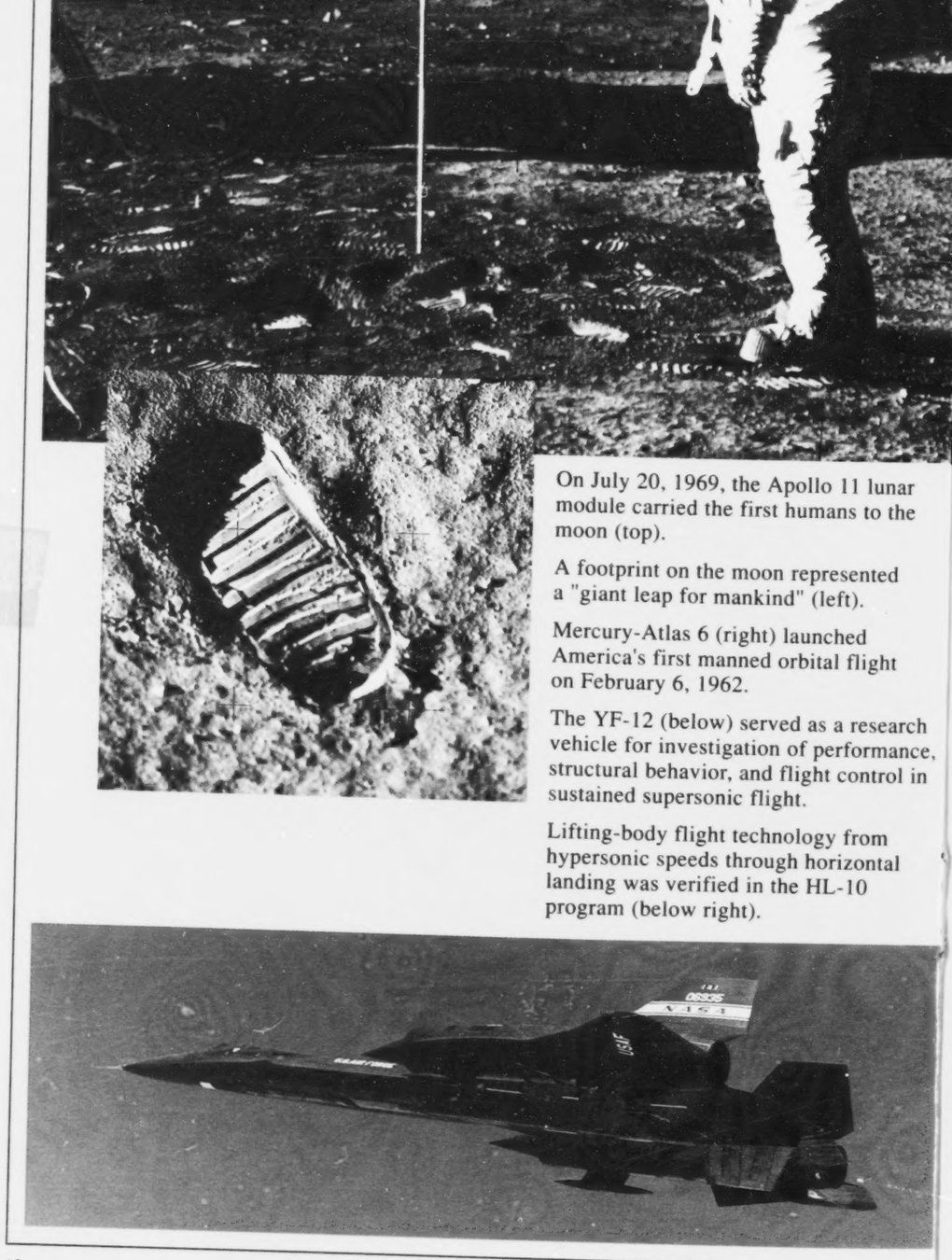
On July 20, 1969, the Apollo 11 lunar module carried the first humans to the moon (top).

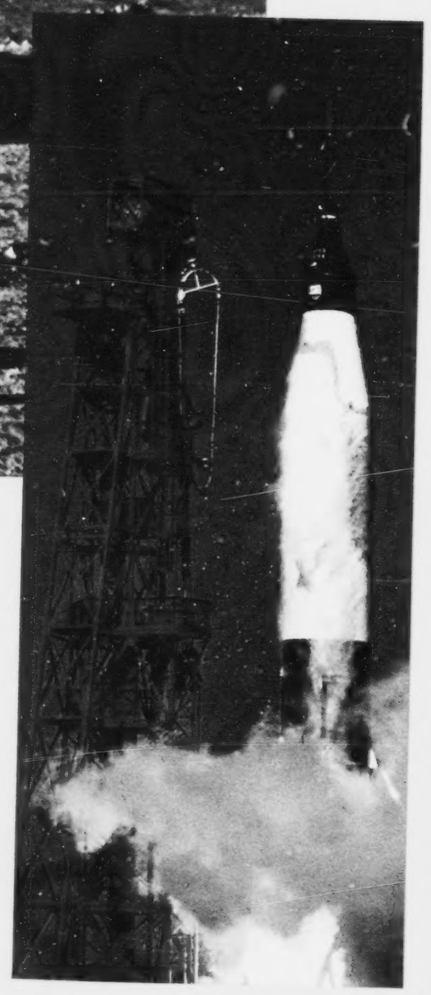
A footprint on the moon represented a "giant leap for mankind" (left).

Mercury-Atlas 6 (right) launched America's first manned orbital flight on February 6, 1962.

The YF-12 (below) served as a research vehicle for investigation of performance, structural behavior, and flight control in sustained supersonic flight.

Lifting-body flight technology from hypersonic speeds through horizontal landing was verified in the HL-10 program (below right).





1960's

Achievement

NASA advances aeronautical research during a remarkable decade of achievement, and American astronauts realize the dream of centuries as they walk the Moon's distant face.

Marshall Space Flight Center

First Weather and Communications Satellites Launched

Mississippi Test Facility (Stennis Space Center)

Cape Canaveral (Kennedy Space Center)

Project Mercury - First Americans in Space

Manned Spacecraft Center (Johnson Space Center)

Apollo 11 Lands on the Moon

YF-12A/XB-70 Supersonic Flight Tests

Grooved Runways

Quiet Engines

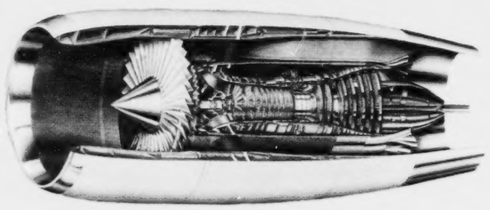
Tiltrotor technology, verified in XV-15 flight research (top), offers vertical landing capability and conventional aircraft cruise economy for future military and civil requirements.

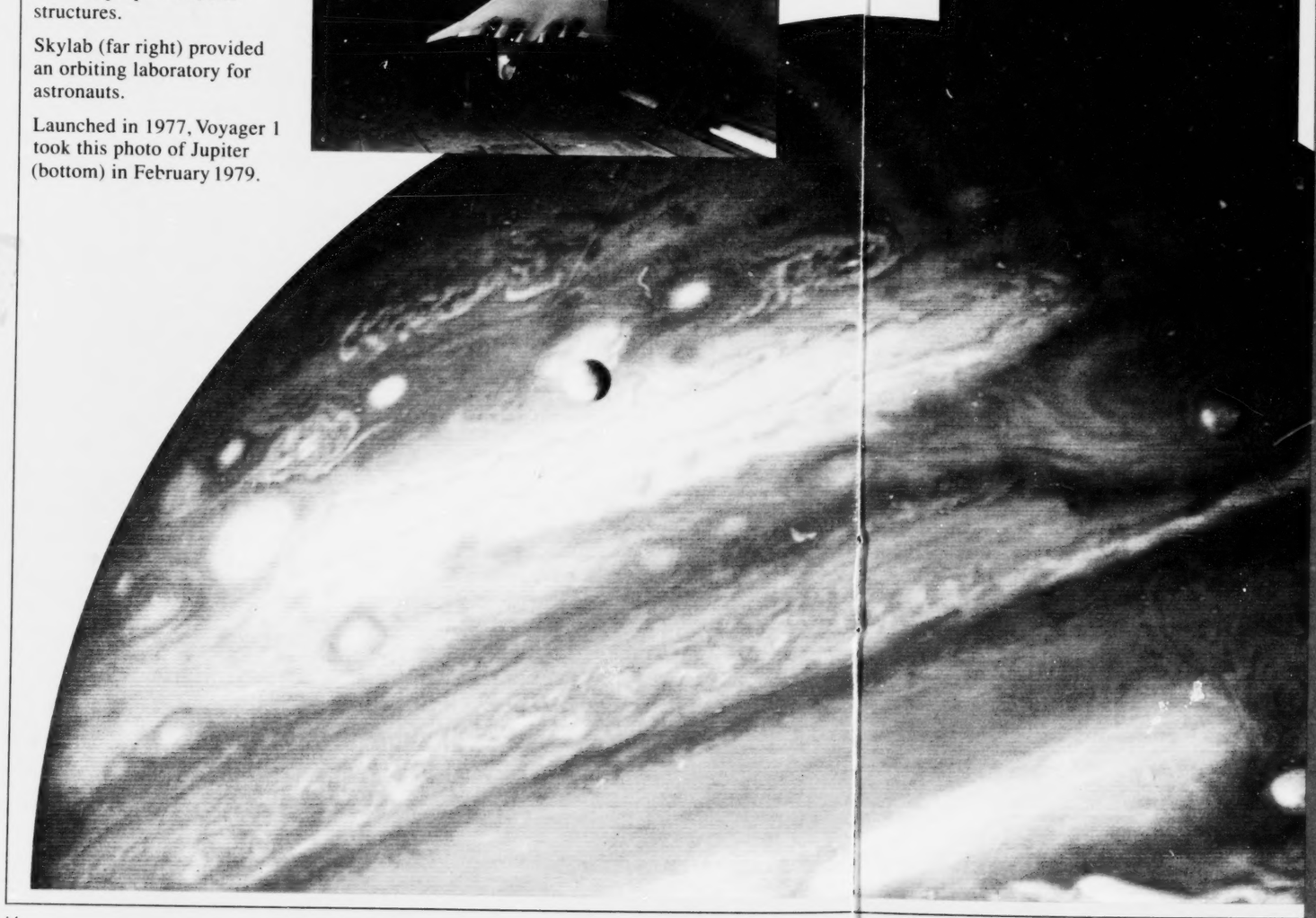
The Aircraft Energy Efficiency program included technology for new fuel-conservative engines (above right) and improvements to existing engines.

Focused supersonic cruise research (near right) provided improvements in aerodynamics, propulsion, and structures.

Skylab (far right) provided an orbiting laboratory for astronauts.

Launched in 1977, Voyager 1 took this photo of Jupiter (bottom) in February 1979.



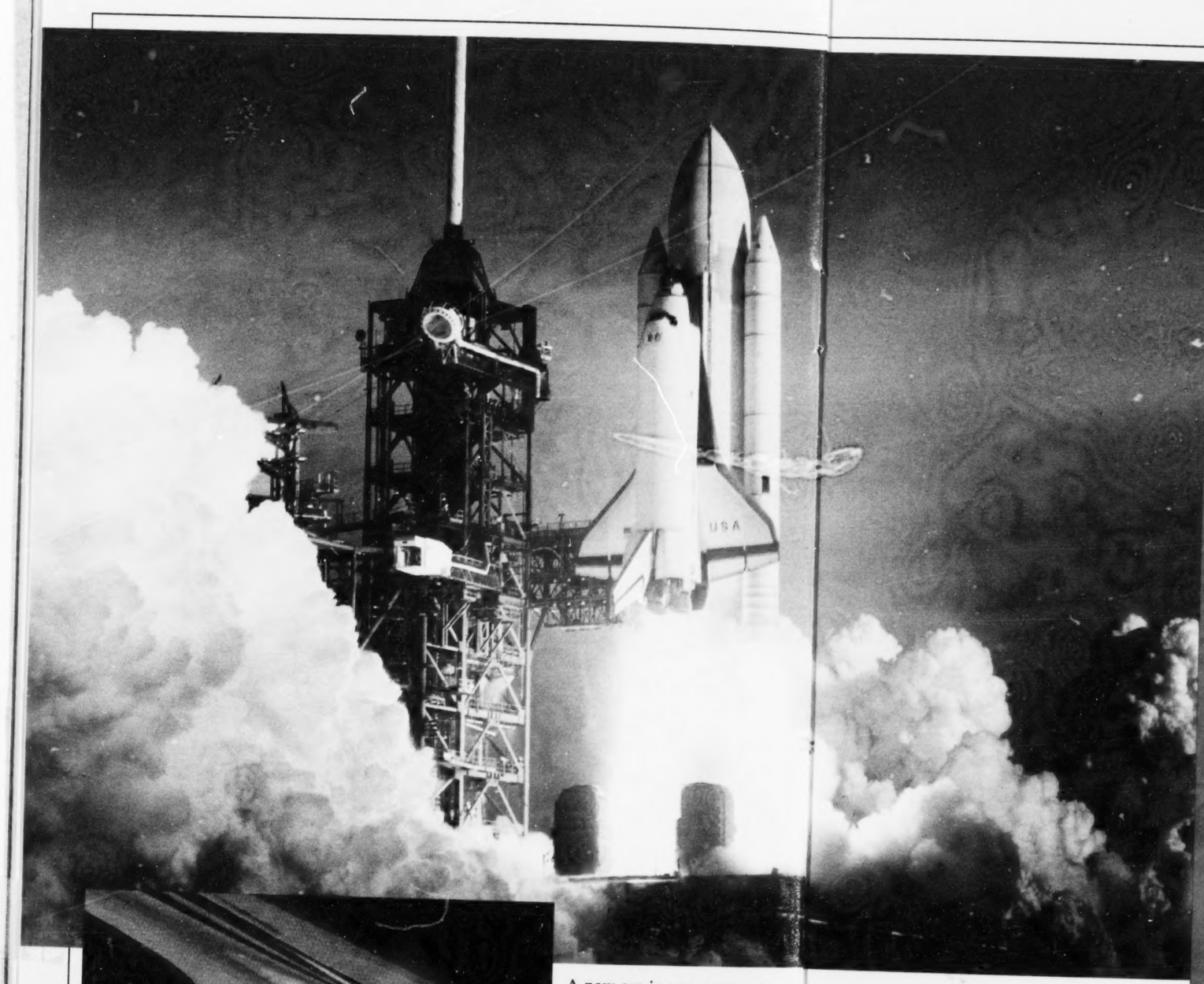


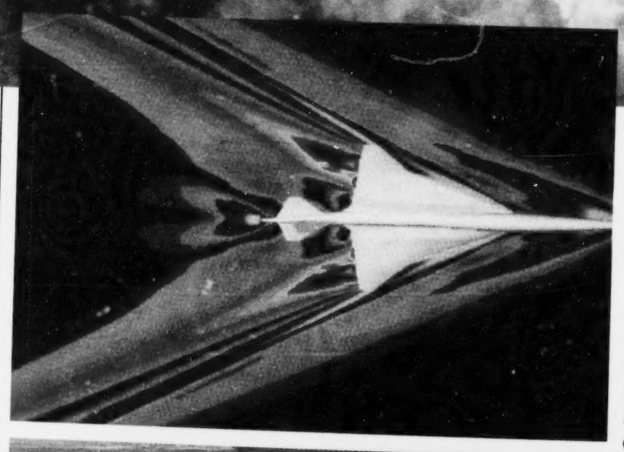
1970's

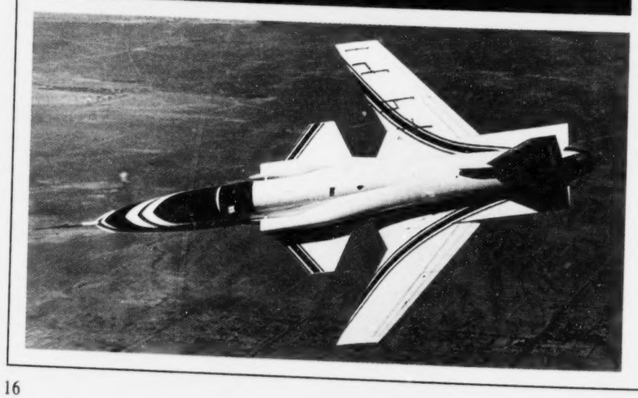
Application

NASA and industry efforts lead to improved, versatile, and more efficient air transport, as well as manned and unmanned space missions that extend our scientific horizons.

- Mariner 9 Orbits Mars
- Supercritical Wing Flight Tests
- Supersonic Cruise Aircraft Research
- Earth Resources Technology Program (Landsat)
- Skylab
- Apollo-Soyuz Test Project
- Aircraft Energy Efficiency Program
- Viking Mars Landing
- XV-15 Tiltrotor Research
- Pioneer Venus Orbit/Probe Venus
- Voyagers 1 and 2 Fly By Jupiter
- Microwave Landing System
- Digital Fly-By-Wire
- STOL Transport Research
- Composite Structures





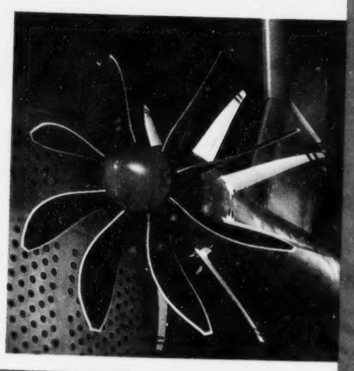


A new era in space transportation began with the Space Shuttle Columbia (above).

Numerical aerodynamic simulation (left) has become a valuable research tool.

X-29 flight research (bottom) verified forward swept-wing technology and provided data on aeroelastic tailoring, active controls, and canard effects.

Advanced turboprop technology (right) will improve fuel efficiency for propeller-driven flight at turbofan speeds.



1980's

Promise

The Space Shuttle comes of age with the launch of Columbia, April 1981, and NASA aeronautics research makes new strides in every flight regime from hover to hypersonic.

X-29 Forward Swept-Wing Flights

Advanced Turboprop Technology

First Space Shuttle Flight – Columbia

First In-Flight Satellite Repair (Solar Max)

National Transonic Facility

Highly Maneuverable Aircraft Technology

Numerical Aerodynamic Simulation Facility

Voyager 2 Reaches Neptune

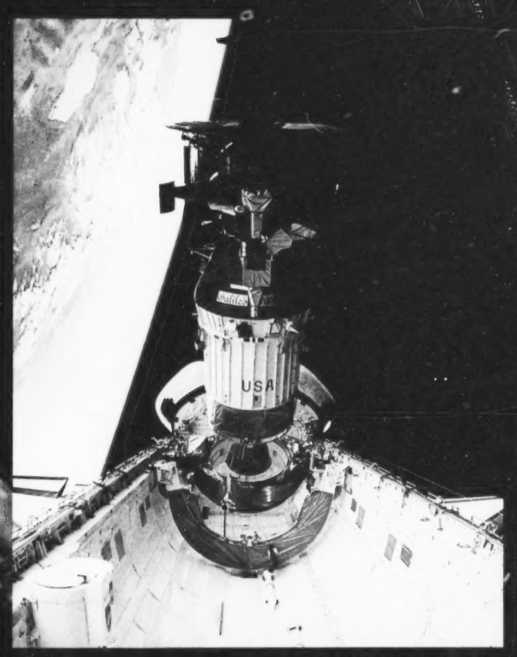
Fault Tolerant Systems

Laminar Flow Research

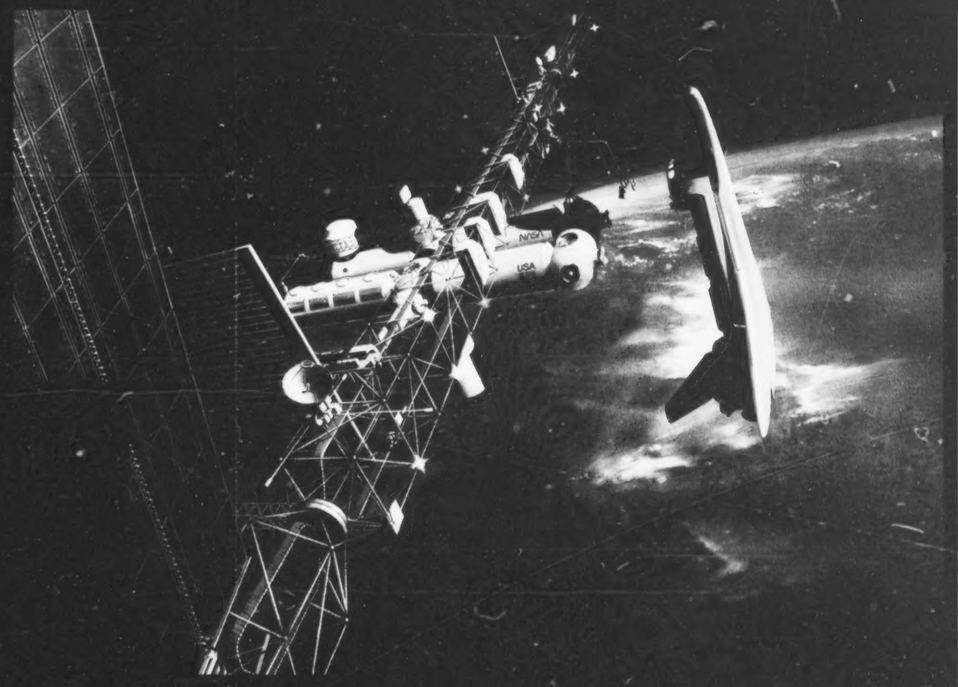
Wind Tunnel Revitalization

Research to establish environmental compatibility, and verification of critical technology, will lead to industry development of high-speed civil transports (left).

The X-30 (foldout) will investigate and verify the critical technologies essential to hypersonic airbreathing flight of horizontal-takeoff-and-landing, single-stage-to-orbit vehicles.

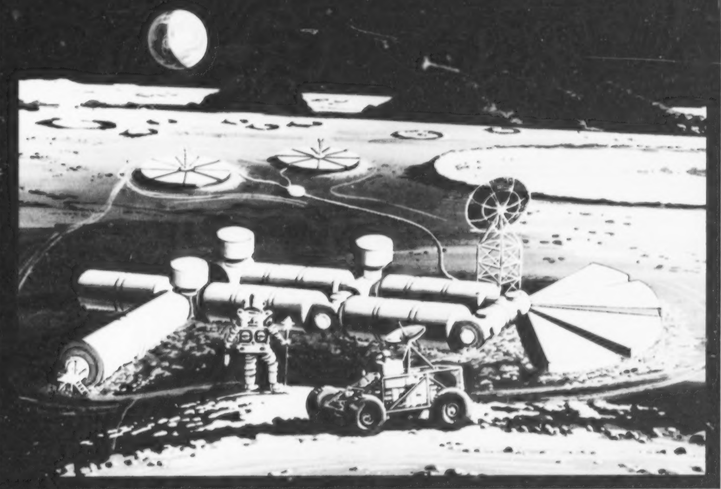


After a 6-year mission, the Galileo orbiter/probe will reach Jupiter in 1995.



Space Station Freedom will serve as a research laboratory and a way point for future space exploration.

A permanent human outpost on the Moon.



1990's AND BEYOND

MAGELLAN, GALILEO, AND ULYSSES HELP USHER IN NEW "GOLDEN AGE" OF SPACE SCIENCE

HUBBLE SPACE TELESCOPE MARKS FIRST OF GREAT OBSERVATORIES

HIGH-SPEED CIVIL TRANSPORT TECHNOLOGY

EXTENDED DURATION ORBITER FLIGHTS LEAD TO INCREASED KNOWLEDGE OF SPACE LIFE SCIENCES

X-30 NATIONAL AERO-SPACE PLANE BUILT AND TESTED

SPACE STATION FREEDOM BECOMES OPERATIONAL

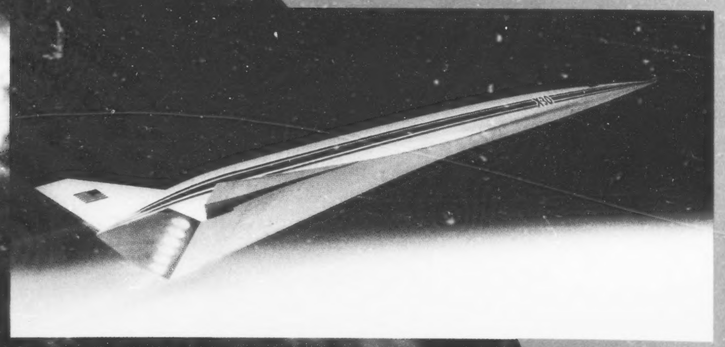
EOS—EARTH OBSERVING SYSTEM

TECHNOLOGY CONTRIBUTIONS TO THE SAFETY AND PRODUCTIVITY OF COMMERCIAL AIR TRANSPORTATION

NEXT GENERATION TRANSPORTATION SYSTEMS SET STAGE FOR HUMAN EXPLORATION OF THE SOLAR SYSTEM

RETURN TO THE MOON, THIS TIME TO STAY

LANDING ON MARS



X-30

A mission to Mars.

"OUR GOAL: TO PLACE AMERICANS ON MARS — AND TO DO IT WITHIN THE WORKING LIFETIMES OF SCIENTISTS AND ENGINEERS WHO WILL BE RECRUITED FOR THE EFFORT TODAY. AND JUST AS JEFFERSON SENT LEWIS AND CLARK TO OPEN THE CONTINENT, OUR COMMITMENT TO THE MOON/MARS INITIATIVE WILL OPEN THE UNIVERSE. IT'S THE OPPORTUNITY OF A LIFETIME — AND OFFERS A LIFETIME OF OPPORTUNITY."

PRESIDENT GEORGE BUSH
FEBRUARY 2, 1990

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